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## Canadian Gas Outlook: A US Supply Issue

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An Intelligence Assessment

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# **Canadian Gas Outlook: A US Supply Issue**

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**An Intelligence Assessment**

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Global Issues. Comments and queries are welcome  
and may be directed to the Chief, Strategic  
Resources Division, OGI, [ ]

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**Canadian Gas Outlook:  
A US Supply Issue**

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**Key Judgments**

*Information available  
as of 1 October 1984  
was used in this report.*

Industry forecasts and our analysis indicate that the United States will become increasingly reliant on Canadian natural gas as US productive capacity declines sharply in the next decade. Under these circumstances, US demand for imported gas could double by 1995 and almost triple by the year 2000. Canadian policy probably would not allow provision of such volumes at current prices.

Several factors are likely to constrain Canada from exporting all of the gas the United States is anticipated to need:

- Recent declines in gas prices and prospects for surpluses in the North American market over the next few years are likely to discourage the investment needed to explore for new reserves and expand production and export capacity.
- Rising domestic Canadian gas consumption will reduce export availability.
- A "Canada first" policy requires Ottawa to set aside sufficient deliverable reserves to cover foreseeable domestic needs.

Unless Canada revises this policy—which would be difficult because it is domestically popular—or a more expansive exploration and development program evolves than is currently justified by market conditions, Ottawa will not have sufficient proved, deliverable reserves to authorize all of the export volumes US purchasers will be attempting to contract for beginning as early as 1990.

Alternative supplies to conventional Canadian gas are available but, in general, are expensive to produce and transport, unavailable in sufficient quantities, or are only available from unreliable sources. Our analysis indicates, for example, that Mexico—which has supplied the United States with a small volume of gas in recent years—probably will not be able to significantly increase gas exports. As a result, Canadian exporters will be in a good position to use "market flexibility" clauses in recently renegotiated contracts to begin to increase prices, perhaps as soon as 1990. A substantial rise in prices may be needed to encourage delivery of the large volume of additional gas US consumers will seek from Canada during the 1990s.

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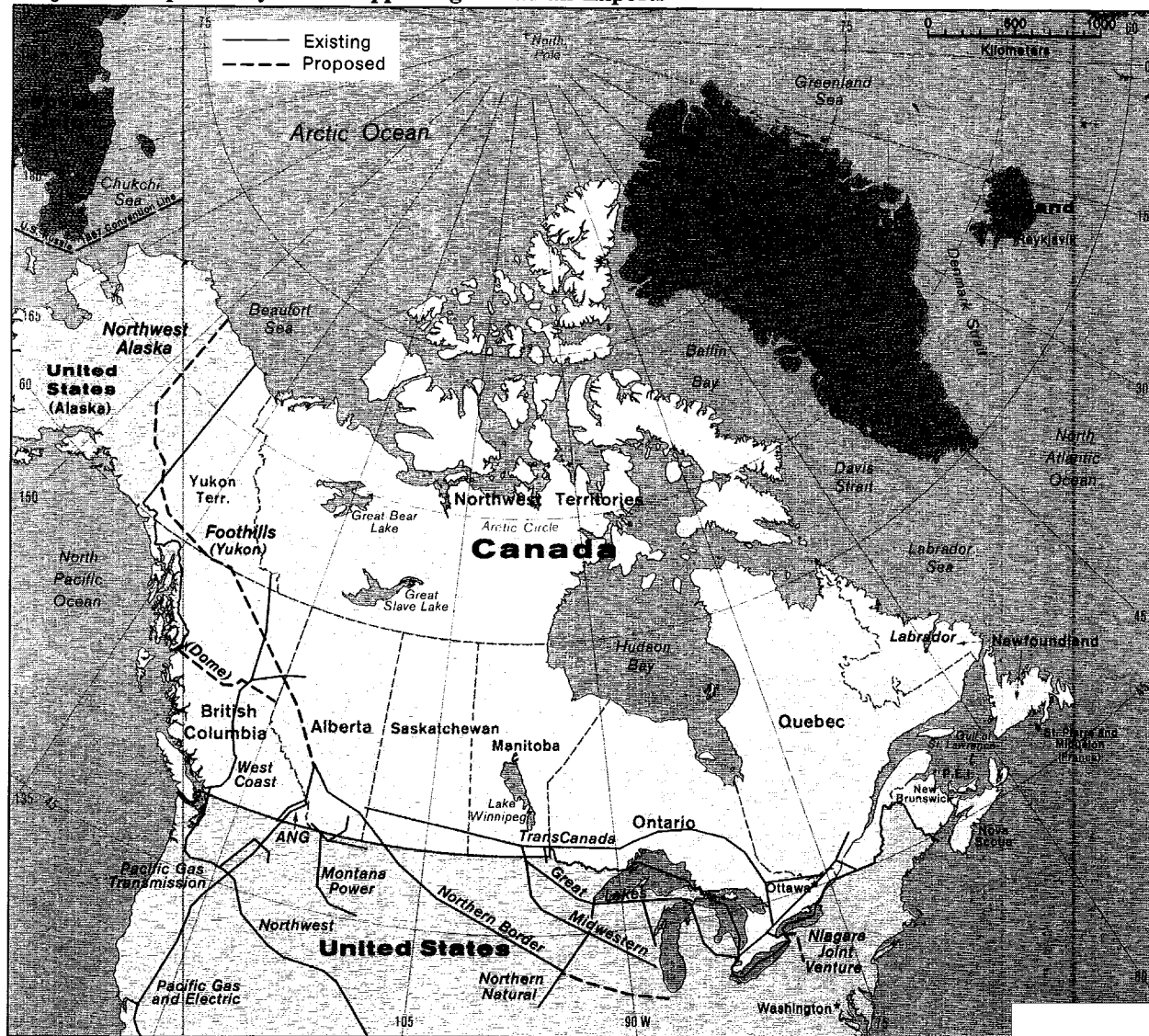
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**Figure 1**  
**Major Gas Pipeline Systems Supporting Canadian Exports**



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## Canadian Gas Outlook: A US Supply Issue

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### Introduction

Canadian natural gas exports to the United States—presently Canada's sole gas export market—have fallen sharply in recent years because of the decline in US consumption, surplus US gas supplies, and high Canadian export prices. Although surplus conditions in the North American market are expected to continue for the next several years, most industry forecasters expect US requirements for Canadian gas to increase in the 1990s as US domestic production declines. The future path of Canadian-US gas trade will depend on several factors, including the growth in demand in both Canada and the United States as well as prospects for new supply projects. Decisions taken by Ottawa on energy policy in the next few years and industry success in locating and developing additional gas resources will determine Canada's ability to meet US gas import requirements in the 1990s without a substantial increase in gas prices.

the decline in volume until 1983. When total revenues slipped in 1984, however, Ottawa announced several changes in an attempt to improve sales opportunities and gain political points from voters in the energy producing provinces. Beginning 1 November 1984, Canadian gas exporters were permitted to continue sales under present contract conditions with incentive prices or to negotiate new prices.<sup>1</sup> Negotiated prices in long-term contracts, however, must be at least equal to the domestic Canadian price.

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### US Need for Canadian Gas

Canada's proximity to the US gas market and its great volume of reserves led to the development of Canadian-US gas trade in the 1950s. US imports of Canadian gas rose fairly steadily, and from 1960 to 1970 more than 40 percent of marketable Canadian gas production was exported under long-term contracts. By the early 1970s, Canada's gas exports to the United States approximated 1 trillion cubic feet (tcf) annually, or about 4.5 percent of total US gas consumption. By 1983, however, significantly higher gas export prices—combined with the economic recession of the early 1980s—contributed to a sharp decline in Canadian gas exports to the United States. Sales fell from 1 tcf in 1979 to about 0.7 tcf in 1983—or about 40 percent of authorized export volumes (table 1).

Despite the current weakness in the North American natural gas market and expectations of surplus supplies for several years, most analysts agree that US gas import requirements will rise substantially in the 1990s and beyond. Industry experts project a sharp decline in US gas productive capacity in coming years, while gas consumption is expected to hold relatively flat or decline only moderately. The US Department of Energy (DOE) projects gas import needs will rise to approximately 1.4 tcf in 1990 and 1.7 tcf in 1995—an increase of almost 100 percent over current levels. On the basis of consumption and production trends in the DOE forecast, we have estimated US import needs in 2000 at about 2.4 tcf. Industry assessments published in trade journals generally are in line with this estimate. These projections indicate that, by the end of the century, gas imports may be supplying as much as 15 percent of total US consumption—compared with about 4.5 percent in 1983.

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Because Canada's gas resources are relatively abundant, many forecasters assume that US needs in this period, and for at least several years beyond, largely will be met by relatively low-cost supplies from

Ottawa moved slowly to change export price policy—although natural gas is Canada's second-largest export earner—because price increases more than offset

<sup>1</sup> Exporters may choose to maintain the uniform border price of \$4.40 per thousand cubic feet (mcf) on 50 percent of total contract volumes and offer an incentive price of \$3.40 per mcf on gas sales above that level.

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**Table 1**  
**Canada: Natural Gas Supply and Demand***Billion cubic feet*  
(except where noted)

	1979	1980	1981	1982	1983 <sup>a</sup>	1984 <sup>b</sup>
Marketable production	2,660	2,427	2,395	2,446	2,375	2,460
Domestic consumption <sup>c</sup>	1,644	1,616	1,589	1,621	1,600	1,650
Net exports to the United States	1,001	796	762	784	715	750
Inventory change <sup>d</sup>	15	15	44	41	60	60
Uniform border export price (US \$ per thousand cubic feet) <sup>e</sup>	3.43	4.47	4.94	4.94	4.40	4.40
Exports as percent of authorized volumes	98.9	73.6	54.4	46.3	41.0	39.0

<sup>a</sup> Preliminary.<sup>b</sup> Projected.<sup>c</sup> Indicated total sales including peak shaving, enrichment, and direct deliveries for industrial use.<sup>d</sup> Includes own use and losses.<sup>e</sup> At yearend.

Canada.<sup>2</sup> Contracts, however, have not been signed for these supplies. Under existing agreements, Canadian gas exports to the United States decline very sharply in the early 1990s, falling to about 170 billion cubic feet (bcf) in 1995 and to zero by 1998. As a result, new contracts will have to be negotiated just to maintain the current level of supplies. Canadian energy policy is a key determinant of the amount of gas that will be available for new contracts.

### Canada's Gas Export Policy

Canadian energy policy emphasizes security of energy supplies for the domestic market and encourages substitution of natural gas and electricity for oil because these energy resources are relatively abundant compared with Canadian oil reserves. As a result of these factors, additional Canadian gas exports will be licensed only after assuring that sufficient deliverable gas reserves exist to meet current export commitments and prevailing domestic needs over a 25-year

<sup>2</sup> As of 1 November 1984, Mexico suspended its only gas contract with US buyers because the Mexican company was unwilling to match Canadian price reductions. This contract may be resumed but is for a small volume of gas and has not been included in supply figures. Algeria also currently supplies about 50 billion cubic feet per year to the US market.

period. Currently, a total of approximately 22 tcf of natural gas reserves, or almost 30 percent of known deliverable reserves, have been set aside for export. Beyond this amount, export requests will be evaluated by Canada's National Energy Board (NEB)—the agency that determines the status of available supplies and authorizes export licenses. At the most recent NEB gas export hearing in 1982, the Board authorized about half the export volumes requested by US buyers after weighing these factors. We expect the next NEB hearing on export licenses to be held within a few years.

### Canadian Gas Demand Projections

On the basis of preliminary data, we estimate natural gas consumption in Canada approximated 1.65 tcf in 1984, about 3 percent above year-earlier levels. To evaluate longer term requirements, we examined a number of government and industry forecasts, including the most recent NEB energy outlook. The NEB periodically reports its assessment of future Canadian energy requirements and published an update in September 1984 in light of the significant changes



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that have occurred in energy use in recent years. The NEB forecast assumes economic growth in Canada of about 3 percent per year from 1983 to 2000 and constant nominal oil prices through 1987 with real increases of about 2 percent per annum thereafter. Assuming continuation of current energy policy, the reference case indicates that:

- Domestic energy demand will increase 1.6 percent per year through the end of the century while gas use climbs about 3 percent annually, rising from about 1.6 tcf in 1983 to approximately 2.4 tcf by 2000.
- Natural gas prices are expected to move in tandem with oil prices, with the gas price to distributors in eastern Canada remaining at about 65 percent of the equivalent cost of oil—a policy measure to ensure substitution of gas for oil. [ ]

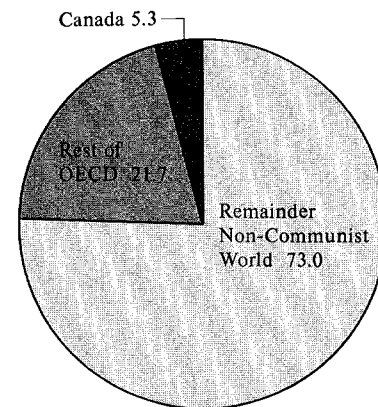
Under the NEB forecast, the natural gas share of total energy will increase from about 23 percent in 1983 to approximately 30 percent by 2000; only the use of hydro and nuclear power for electricity generation are projected to grow more rapidly. Other forecasts we examined generally agree with this projection, and we believe the forecast provides a reasonable base case estimate. The Board's gas demand forecast indicates that under current policy Canada will have either used or set aside for domestic consumption deliverable gas reserves of about 55 to 60 tcf by the year 1990, when previously authorized exports begin to fall sharply. [ ]

### Gas Reserve Estimates

Established reserves increased 55 percent from 1970 to 1983 and, according to the Canadian Petroleum Association, approximated 94 tcf at yearend 1983. This constitutes about 20 percent of proved OECD gas reserves and approximately 5 percent of non-Communist reserves (figures 2 and 3). About 80 percent of these resources, or about 77 tcf, are located in the western provinces, primarily Alberta, British Columbia, and Saskatchewan. These reserves are relatively close to existing transportation facilities and markets and will be used to meet almost all domestic requirements and currently authorized exports for the next 10 years or so. [ ]

**Figure 2**  
**Proved Natural Gas Reserves, 1983<sup>a</sup>**

Percent



Trillion cubic feet

<b>Non-Communist World</b>	1,757.0
Of which OECD	474.0
Of which Canada	94.0

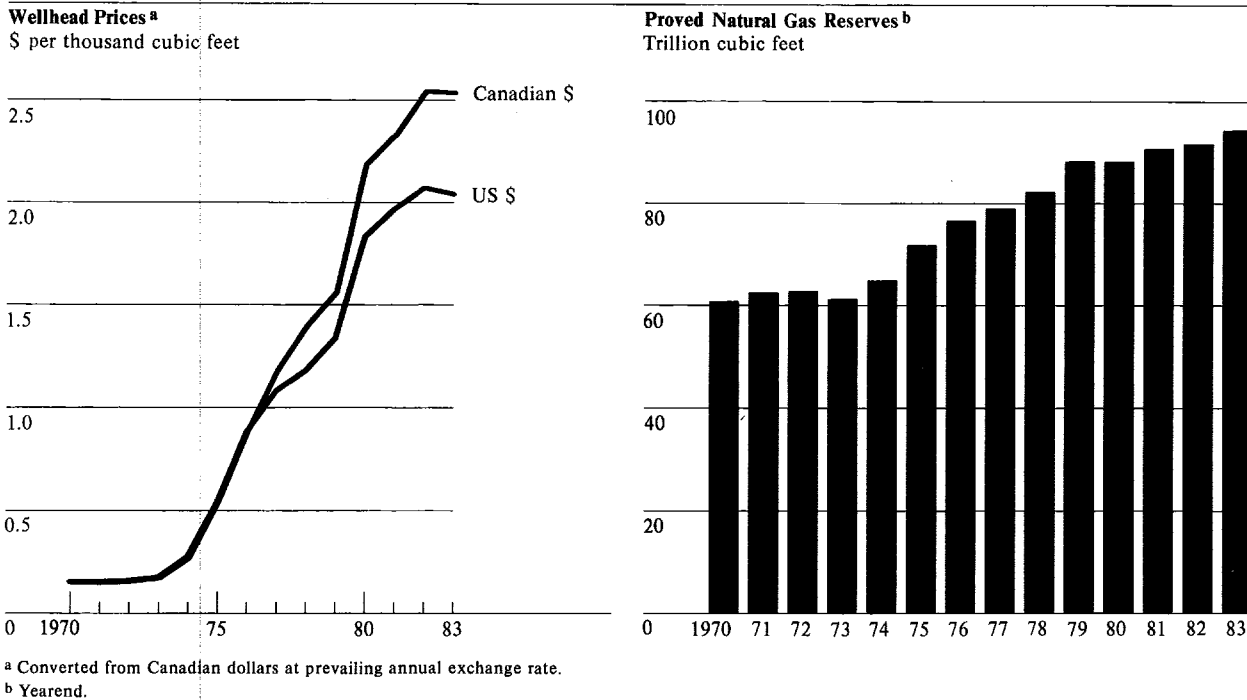
<sup>a</sup> Yearend.

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Known gas reserves in the frontier areas—including the Beaufort Sea/Mackenzie Delta, the high Arctic, and the east coast offshore—approximated 17 tcf at yearend 1983. For the most part, the NEB expects gas output from Canada's frontier areas to remain out of economic reach in this century and has excluded these resources from the Board's estimates of deliverable reserves. On the basis of NEB reserve estimates and projected requirements, all proved reserves in conventional areas—the western provinces—are already committed. As a result, unless the current policy of assuring future supplies for the domestic market before exports are permitted is modified, or frontier gas reserves are reclassified as deliverable, additional gas exports in this century will depend on reserve additions in the western provinces. [ ]

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**Figure 3**  
**Wellhead Prices and Natural Gas Reserves, 1970-83**



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The NEB currently projects additions to gas reserves in the west to average about 3 tcf per year through 2000. Despite the favorable potential for additional gas discoveries in these areas, we judge the NEB assessment to be optimistic because the projection assumes a drilling rate 30 percent higher over the forecast period than that experienced from 1960 to 1980. Such a rate is not consistent with future price expectations:

- The current gas surplus in North America is expected to continue for at least the next few years and has already led to a slowdown in drilling activity. Moreover, contrary to the almost 13-fold increase in producer gas prices from 1970 to 1983, wellhead prices are likely to hold flat or decline for the next several years.

- The NEB assumption of a 2- to 3-percent increase in real oil prices beginning in 1987 is higher than estimates by most other analysts. Indeed, many analysts expect a further decline in nominal oil prices, which would place additional downward pressure on gas prices.

#### Supply Implications for the United States

Given the market outlook over the next few years, we believe that the NEB has overestimated gas reserve additions by a substantial amount, perhaps by as much as half. As a result, unless Ottawa's policy

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**Table 2**  
**Canada-United States:**  
**Projected Gas Requirements and Availability**

Billion cubic feet

	1984	1985	1990	1995	2000
Canadian productive capacity <sup>a</sup>	4,839	4,903	4,735	4,288	3,900-4,300
Less Canadian demand <sup>b</sup>	1,901	2,024	2,446	2,564	2,775
Total export availability <sup>c</sup>	2,938	2,879	2,289	1,724	1,125-1,525
Total available to the United States <sup>d</sup>	2,938	2,879	2,089	1,524	925-1,325
Projected total US import requirements <sup>e</sup>	880	1,240	1,400	1,700	2,400 <sup>f</sup>
Less Mexican/Algerian imports <sup>g</sup>	104	50	50	50	50
Projected US requirements from Canada or other sources	775	1,190	1,350	1,650	2,350
Approved Canadian exports to the United States	1,923	2,198	1,700	166	0

<sup>a</sup> Projected gross natural gas productive capacity in conventional areas, including established reserves and projected reserve additions. Assumes unconstrained pipeline capacity. National Energy Board projection to 1995; CIA projection for 2000.

<sup>b</sup> National Energy Board forecast. Includes net sales, pipeline fuel and losses, reprocessing fuel and shrinkage. Excludes projected demand in Atlantic provinces because development of that market is contingent on east coast offshore gas development.

<sup>c</sup> Theoretically the total volume of gas available for export; assumes export licenses are approved.

<sup>d</sup> Total export availability less volumes committed to support export of liquefied natural gas to Japan.

<sup>e</sup> US Department of Energy *Annual Energy Outlook 1983* forecast. Forecast assumes US economic growth of 2.9 percent per annum from 1983 to 1995 and flat real oil price in 1990 compared to 1983 price.

<sup>f</sup> DOE forecast extends only to 1995. Estimate for 2000 is derived by maintaining consumption and production trends from 1990 to 1995.

<sup>g</sup> Mexico suspended its gas contract with US buyers 1 November 1984. Because it is uncertain whether this contract of 80 bcf per year will be resumed, it is excluded from projections of available supply.

changes, total Canadian gas export availability could begin to fall short of projected US import demand in the mid-1990s. By 2000 the volume of gas for export from the western areas could approximate only 60 percent of projected US import needs, or perhaps 1.5 tcf per year compared with forecasted requirements of 2.4 tcf (table 2). Moreover, we believe that, as export volumes approach current license maximums late in this decade and US buyers scramble to line up new supplies, Canadian exporters will be in a good position to use "market flexibility" clauses in recently renegotiated contracts to begin to increase prices. This trend of tightening supplies and rising prices could begin to show itself around 1990. If Ottawa continues to actively seek alternative gas export markets in the next few years—such as the proposed export of liquefied natural gas (LNG) to Japan—supply availability would be even further constrained.

### The Frontier Option

Reclassification of frontier gas resources as "deliverable" would increase export availability by freeing up additional, relatively low-cost supplies from the west for export. We agree, however, with the NEB assessment that high development and transport costs will cause most frontier gas to remain out of economic reach in the forecast period. Indeed, unless several sizable new gas development plans are initiated within the next three to five years, we doubt that gas production in the frontier areas will reach even the modest level the NEB estimates. Although natural gas availability would be greater if frontier area development responds more rapidly to the need for increased supply than we have anticipated, prices would have to increase substantially to stimulate such development activity.

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**Canadian Gas—Other Export Markets?**

*The decline in Canadian gas export volumes in the early 1980s increased Ottawa's desire to develop alternative export markets for natural gas. The perceived advantages of establishing an LNG export capability combined with Japan's desire to diversify its sources of gas supplies led to several proposals for Japanese-Canadian gas trade. Only one of these projects—the Dome Western LNG project—has made any headway, and it has faced numerous financial and regulatory problems that have delayed startup until at least 1987 or 1988. The precarious financial position of Dome Petroleum—the project's major sponsor—and Canadian gas producers' doubts about the economics of the project remain serious obstacles to final export approvals. A decision to delay indefinitely or abandon the proposal—because of Canadian reservations or forecasts that indicate little Japanese need for this gas until at least the early 1990s—would allow the 2.3 tcf of dedicated gas reserves to be available to US buyers. Alternatively, however, a decision to push forward with this project despite the questionable economics would underscore Ottawa's determination to develop additional gas export markets and, given the limited amount of gas we believe will be available for export, would increase competition for Canadian gas supplies and exacerbate upward price pressures in the next decade.* [ ]

Even if prices rise within the next several years, the improved financial incentive might not spur actual development activity unless Canada relaxes its guidelines on foreign participation in frontier energy projects. The Mulroney government is considering changes in foreign investment rules that could help open the area to possible US company interest. The advantages of this policy change in terms of incentives to develop, however, are apt to be offset by a possible elimination of grants for frontier exploration that have been provided by the government. For example, the Petroleum Incentive Payment program—which allowed companies to recover up to half of total exploration costs in frontier areas, depending on the degree of Canadian participation—is to expire in 1986. [ ]

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**The Frontier Areas: A Status Report**

*Forecasts of increasing demand for Canadian natural gas both at home and in the United States indicate that a substantial volume of gas production from frontier areas could be needed in the late 1990s and beyond. Yet, Canada's National Energy Board assumes gas output in frontier areas—from unspecified projects—at zero in the late 1980s and about 400 bcf by the late 1990s, and we believe that even this estimate probably is optimistic. Despite the known gas reserves in these areas and the high potential for additional discoveries, frontier resources are located far from established markets and have long development leadtimes and substantial development costs. These high costs—combined with the recent extreme softness of the North American gas market—already have caused a number of development proposals for the east coast offshore and the Arctic gas to be delayed or abandoned:*

- *Drilling results from Mobil Canada's Venture gas-field—located 210 kilometers offshore Nova Scotia and 16 kilometers east of Sable Island—have been disappointing (figure 4). Recoverable gas reserves in this structure now are judged to be 1.5-2 trillion cubic feet, or about 40 percent below the volume deemed necessary to make development economic. While [ ] total gas production from the east coast offshore could be as much as 1 billion cubic feet per day by the early 1990s, firm development plans to support this rate of output do not exist. Because both the federal and provincial governments are heavily promoting the Sable Island project, this one development could be completed perhaps by around 1990. The hurdles of proving adequate reserves, sales contracts, import and export approvals, and project financing must still be cleared, however, and a large portion of this gas would be used in new markets in eastern Canada and the United States.*
- *Canada's other much discussed potential frontier gas development proposal, the Arctic Pilot Project, was officially shelved by the NEB in mid-1984 because of ample supplies, the expiration of a preliminary sales agreement with US buyers, environmental concerns, and the necessity of developing new LNG tanker technology (figure 5).* [ ]

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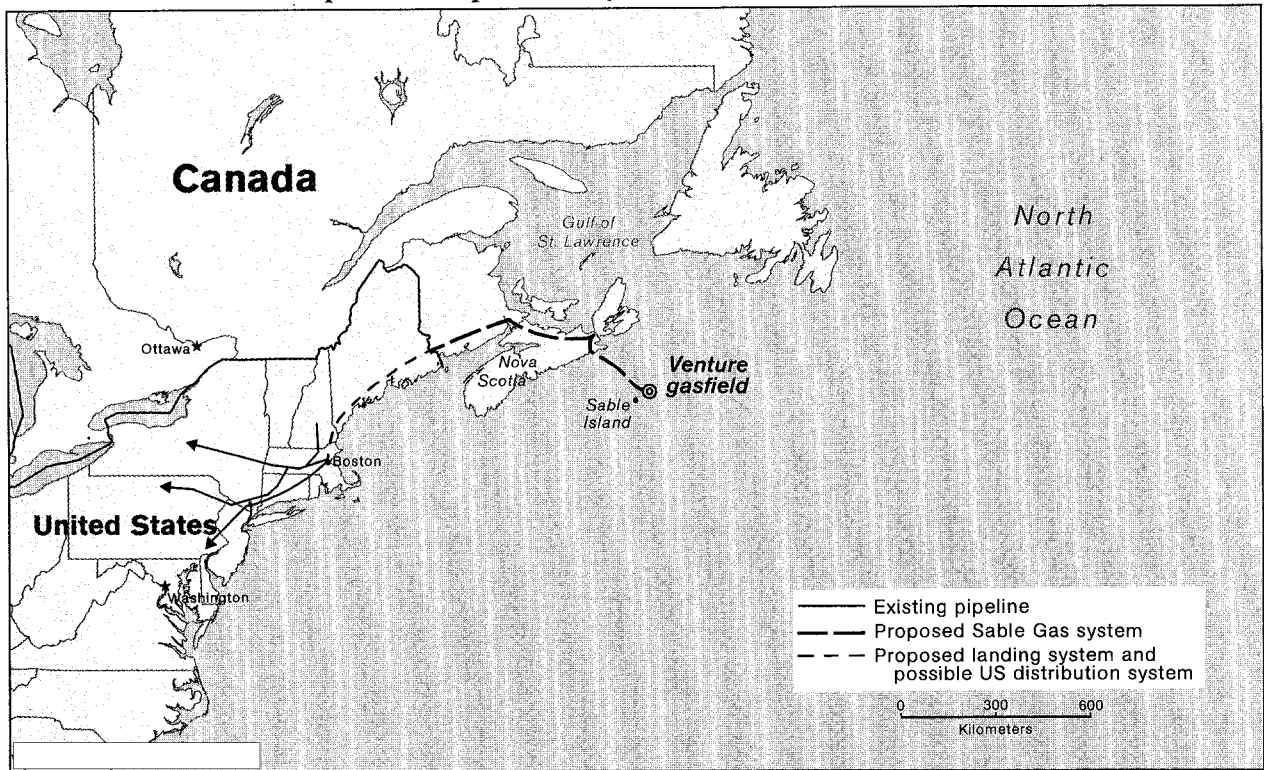
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**Figure 4**  
**The Venture Gasfield: Proposed Transportation Systems**



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#### Non-Canadian Supply Alternatives

The United States has few alternative natural gas supply options. One of these alternatives is the Alaska Natural Gas Transportation System (ANGTS) (figure 6). Completion of ANGTS—a 7,700-kilometer pipeline to transport Alaskan and Canadian natural gas to the 48 contiguous states—would substantially lower US import requirements in the late 1990s and beyond. Very optimistic estimates indicate the earliest date for completion is the early 1990s—a seven-year delay from original projections. If completed, the line could eventually carry as much as 1.2 tcf of gas per year and probably also would encourage additional exploration in nearby areas. Total investment to date of about \$3.2 billion from both Canadian and US investors has allowed 32 percent of the pipeline to be constructed, but project completion hinges on the availability of private financing. Estimates of the total cost approximate \$40 billion, however, and the delivered price of this gas would be very high. Moreover,

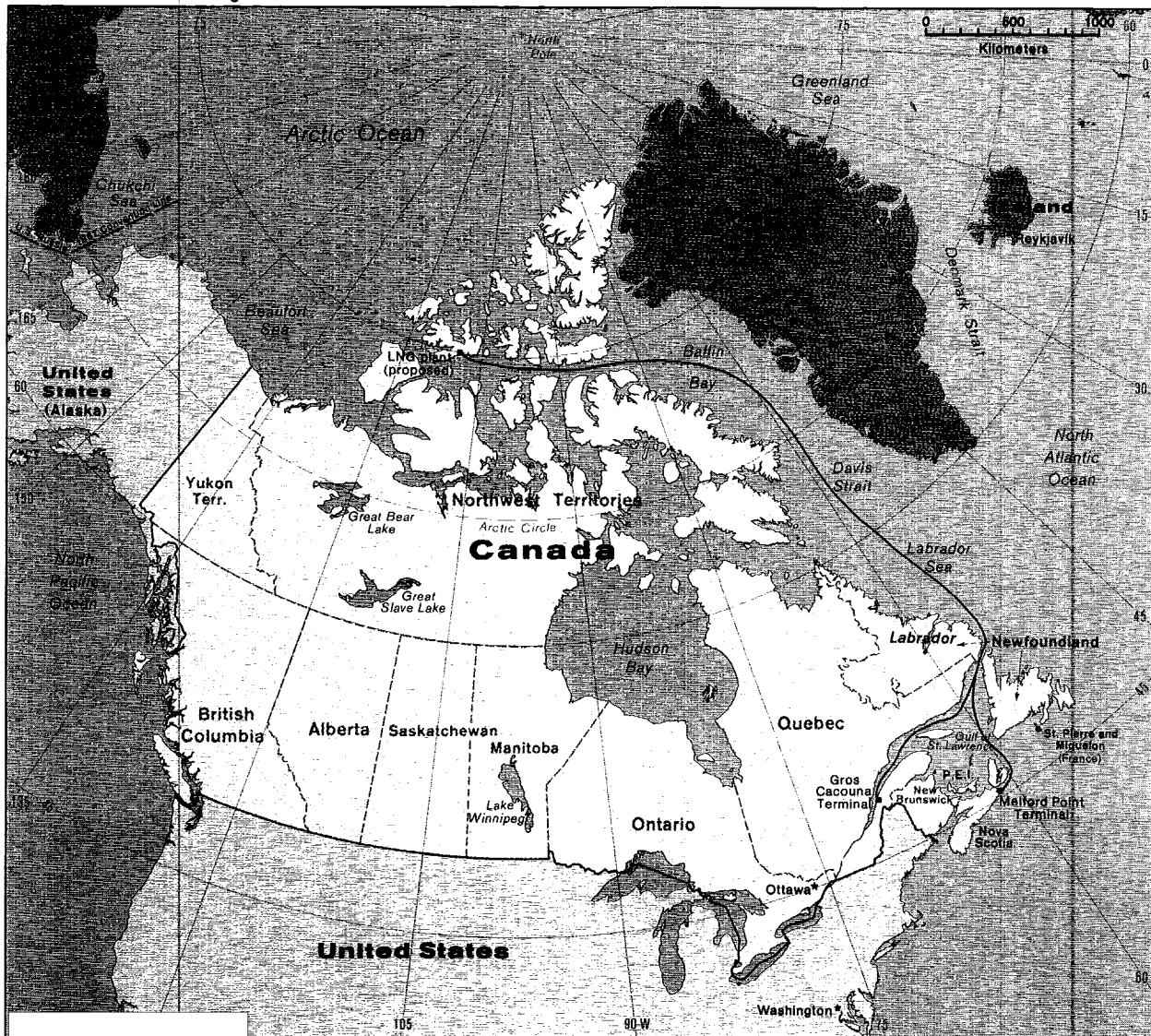
other proposals for the transport and sale of Alaskan natural gas, such as a possible LNG export project, cause the future of ANGTS to be questionable.

Although the United States has traditionally received some small volume of gas imports from Mexico and Algeria, the outlook for a substantial increase in availability from these two sources is not promising:

- PEMEX, the Mexican petroleum company, recently suspended its only gas contract with US buyers, and our analysis indicates Mexico probably will not be in a position to increase gas exports significantly over the forecast period.<sup>3</sup>

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**Figure 5**  
**The Arctic Pilot Project Route**



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- Algeria probably could increase exports to cover a small part of projected US needs in the late 1990s. Price terms probably would be extremely stringent, however, and Algiers' record as a reliable supplier has been poor.

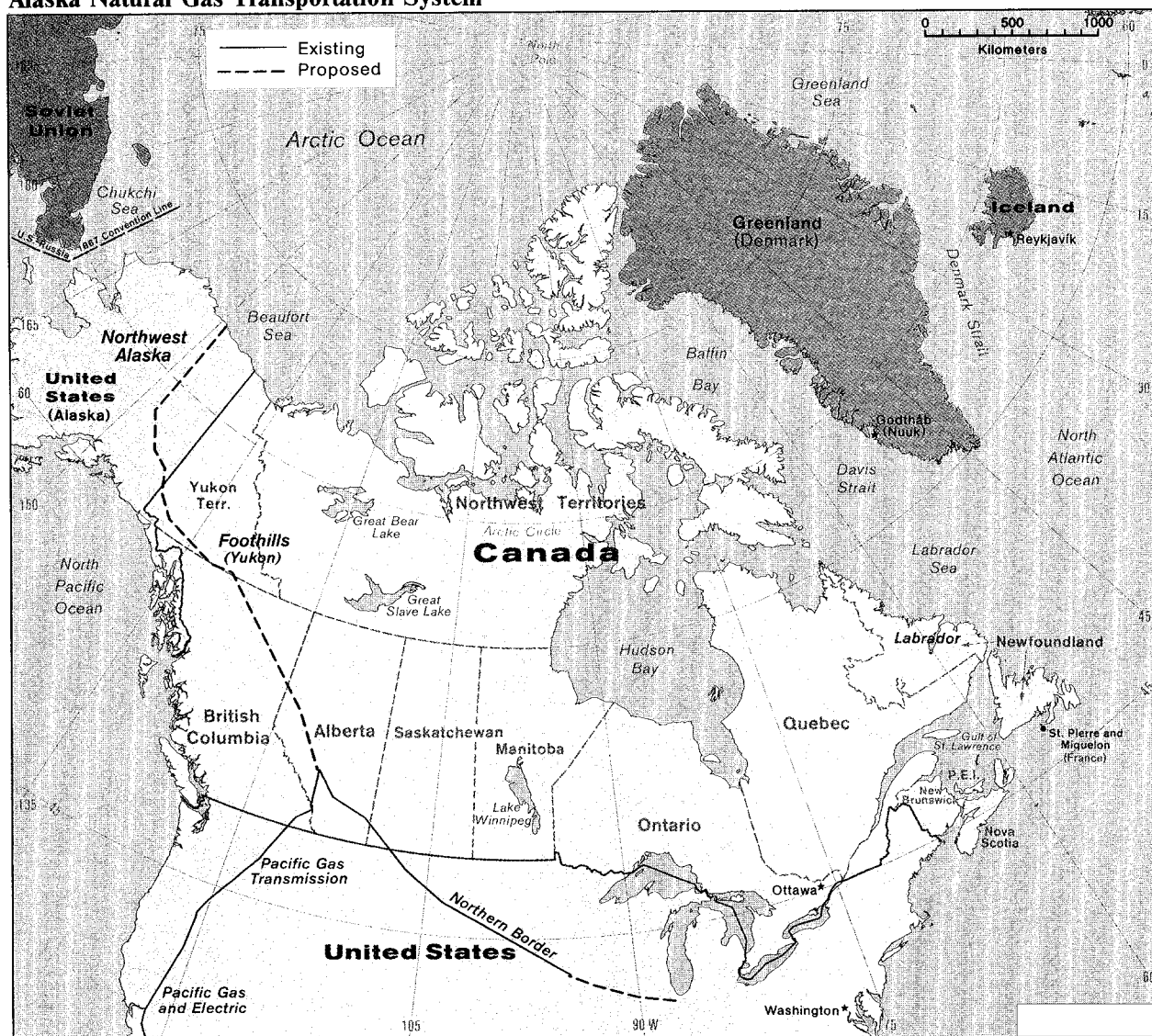
#### **The Outlook**

We believe Ottawa will be reluctant to license for export all the gas the United States will need beginning in the mid-1990s. In our view, export availability

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**Figure 6**  
**Alaska Natural Gas Transportation System**



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could only be increased in the short term by a modification to Canada's stringent reserve test. Because this policy enjoys widespread public support, however, we doubt that Ottawa would willingly embrace such a change. Similarly, reassessment of frontier gas resources as "deliverable" also would increase supplies available for export, but Ottawa probably would demand a significant price premium to trade relatively low-cost western supplies set aside to serve the Canadian market for high-cost frontier resources.

As a result, as Canadian gas supplies become constrained by growing internal needs and domestic policy, gas exporters likely will be able to demand increased prices for western gas exports. Supply availability from the west probably could be enhanced for a limited time by an expansive gas exploration and



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development program, but we expect contrary market signals to discourage required investment until market prospects improve or modifications to the fiscal regime are made to improve exploration economics.

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Limited Canadian gas supplies could affect certain regions of the United States more than others. For example, some western states, such as Washington and California, and states that border Canada rely on gas imports to meet as much as 50 percent of total needs. In a limited number of metropolitan areas, reliance on Canadian gas imports approximates 100 percent. The current US gas pipeline system is not designed to transport substantial volumes of US natural gas to these areas because it has not been necessary in the past. As a result, supply constraints could have a more direct, immediate impact on these areas. In addition, because of the current gas surplus, Canadian gas exporters are attempting to increase gas sales in the northeastern United States. This area views Canada as a logical major gas supplier, and new investments in pipeline transportation systems are being undertaken in an attempt to replace oil. Once these substitutions have occurred, however, flexibility to move away from gas use in the residential sector will be extremely limited. [REDACTED]

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